

What is claimed:

Sub A1 → 1. An optical transmission method using Raman amplification for transmitting a wavelength division multiplexed signal light including a plurality of optical signals of different wavelengths among a plurality of optical transmission apparatuses and supplying a pumping light to a Raman amplification medium existing on an optical transmission path, to Raman amplify the wavelength division multiplexed signal light being propagated through the Raman amplification medium, wherein

a supervisory signal transferred among said plurality of optical transmission apparatuses is superimposed on the pumping light supplied to said Raman amplification medium.

2. An optical transmission method using Raman amplification according to claim 1, wherein

when a plurality of pumping lights of different wavelengths are supplied to said Raman amplification medium,

said supervisory signal is superimposed on at least one of said plurality of pumping lights.

Sub A2 → 3. An optical transmission method using Raman amplification according to claim 2, wherein

the pumping light to be superimposed with said supervisory signal is selected out of said plurality of pumping lights based on loss wavelength characteristics of said optical transmission path.

4. An optical transmission method using Raman amplification according to claim 3, wherein

the pumping light to be superimposed with said supervisory signal is selected out of said plurality of pumping lights so that a loss of said optical transmission path in a Raman gain band corresponding to a wavelength of said pumping light becomes smaller than the loss of said optical transmission path corresponding to a wavelength of the other pumping light.

Sub A3 → 5. An optical transmission method using Raman amplification according to claim 2, wherein

a part of the Raman amplified wavelength division multiplexed signal light input to said optical transmission apparatus through said optical transmission path is led to an optical filter having a passing band in a Raman gain band corresponding to a wavelength of the pumping light superimposed with said the supervisory signal, to detect said supervisory signal using a light passing through said optical filter.

6. An optical transmission method using Raman amplification according to claim 2, wherein

the supervisory signal transmitted from a previous stage optical transmission apparatus is detected to superimpose a suppression signal to suppress said detected supervisory signal on the pumping light corresponding to the pumping light superimposed with the supervisory signal from said previous stage optical transmission apparatus, among the pumping lights of different wavelengths to be supplied to said Raman amplification medium.

7. An optical transmission method using Raman amplification according to claim 6, wherein

the supervisory signal to be sent to a succeeding stage optical transmission apparatus is superimposed on the pumping light different from the pumping light superimposed with the suppression signal.

8. An optical transmission system using Raman amplification comprising a plurality of optical transmission apparatuses for transmitting a wavelength division multiplexed signal light including a plurality of optical signals of different wavelengths, and a Raman amplifier for Raman amplifying the wavelength division multiplexed signal light being propagated through a Raman amplification medium by supplying a pumping light to said Raman amplification medium existing on an optical transmission path, wherein

said Raman amplifier includes a supervisory signal superimposing section for superimposing a supervisory signal transferred among said plurality of optical transmission apparatuses on the pumping light supplied to said Raman amplification medium.

9. An optical transmission system using Raman amplification according to claim 8, wherein

said Raman amplifier has a plurality of pumping light sources generating a plurality of pumping lights of different wavelengths, and

said supervisory signal superimposing section superimposes said supervisory signal on at least one of said plurality of pumping lights supplied to said Raman amplification medium from said respective pumping light sources.

Sub A5
10. An optical transmission system using Raman amplification according to claim 9, wherein

said supervisory signal superimposing section selects the pumping light to be superimposed with said supervisory signal is selected out of said plurality of pumping lights based on loss wavelength characteristics of said optical transmission path.

11. An optical transmission system using Raman amplification according to claim 10, wherein

said supervisory signal superimposing section selects the pumping light to be superimposed with said supervisory signal so that a loss of said optical transmission path in a Raman gain band corresponding to a wavelength of said pumping light becomes relatively small.

Sub A6
12. An optical transmission system using Raman amplification according to claim 9, wherein

said optical transmission apparatus has an optical coupler for branching a part of the Raman amplified wavelength division multiplexed signal light sent from said optical transmission path, an optical filter input with a branched light from said optical coupler and having a passing band in a Raman gain band corresponding to a wavelength of the pumping light superimposed with said the supervisory signal, and a supervisory signal detecting section for detecting said supervisory signal using a light passing through said optical filter.

13. An optical transmission system using Raman amplification according to claim 9, wherein

when a plurality of said Raman amplifier are provided corresponding to respective repeating areas among said plurality of optical transmission apparatuses, said each Raman amplifier includes a suppression signal superimposing section for superimposing a suppression signal to suppress the supervisory signal from a

previous stage optical transmission apparatus detected at the corresponding optical transmission apparatus on the pumping light corresponding to the pumping light superimposed with the supervisory signal, among the pumping lights of different wavelengths to be supplied to said Raman amplification medium.

14. An optical transmission system using Raman amplification according to claim 13, wherein

said supervisory signal superimposing section of each Raman amplifier superimposes the supervisory signal to be sent to a succeeding stage optical transmission apparatus on the pumping light different from the pumping light superimposed with the suppression signal.

- Sub A7 → 15. A Raman amplifier comprising a pumping light generating section for generating a pumping light and a multiplexer for supplying the pumping light from said pumping light generating section to a Raman amplification medium, for Raman amplifying a wavelength division multiplexed light being propagated through said Raman amplification medium, wherein

said Raman amplifier includes a supervisory signal superimposing section for superimposing a supervisory signal transferred among said plurality of optical transmission apparatuses for transmitting said wavelength division multiplexed light on the pumping light supplied to said Raman amplification medium from said pumping light generating section via said multiplexer.

16. A Raman amplifier according to claim 15, wherein

said Raman amplifier has a plurality of pumping light sources generating a plurality of pumping lights of different wavelengths, and

said supervisory signal superimposing section superimposes said supervisory signal on at least one of said plurality of pumping lights supplied to said Raman amplification medium from said respective pumping light sources via said multiplexer.

- Sub A8 → 17. A Raman amplifier according to claim 16, wherein

said Raman amplifier includes a suppression signal superimposing section for superimposing a suppression signal to suppress the supervisory signal from a previous stage optical transmission apparatus on the pumping light corresponding to the pumping light superimposed with the supervisory signal from said previous stage optical transmission apparatus, among the pumping lights of different wavelengths to

be supplied to said Raman amplification medium from said respective pumping light sources via said multiplexer.

18. A Raman amplifier according to claim 17, wherein
said supervisory signal superimposing section superimposes the supervisory signal to be sent to a succeeding stage optical transmission apparatus on the pumping light different from the pumping light superimposed with the suppression signal.